

CLAIMS

1. Process for bending workpieces (1), particularly pipes, wires, bars, semi-finished products, sheet metal or the like, with at least one bending device (6), characterized in that at least one robot (3) picks up the workpiece (1) to be shaped and feeds it to the at least one bending device (6) for shaping, in particular bending.
2. Process according to claim 1, characterized in that the robot (3) continuously feeds the workpiece (1) to the at least one bending device (6).
3. Process according to claim 1 or 2, characterized in that the robot (3) grips the workpiece (1) while feeding it into the at least one bending device (6) during bending and, for further bending, feeds it anew to the at least one bending device (6) and optionally rotates the workpiece (1) radially.
4. Process according to as least one of the claims 1 to 3, characterized in that a robot arm (4), particularly its gripping device (5) of the at least one robot (3), picks up the workpiece (1) and directly feeds it to the at least one bending device (6) or directly to its bending head.

5. Process according to at least one of claims 1 to 4, characterized in that the robot arm (4) feeds the workpiece (1) batch-wise to the at least one bending device (6) and the bending device (6) shapes the workpiece (1) at corresponding bending regions, optionally during the shaping the robot arm (4), in particular the gripping device (5), picking up the workpiece (1) by gripping it at any different place, or optionally also in the finished region, to further feed the workpiece (1) into the at least one bending device (6).
6. Process according to at least one of claims 1 to 5, characterized in that the at least one robot (3), particularly the at least one gripping device (5) of the robot arm (4), picks up the workpiece (1) and feeds it to a plurality of bending devices (6) for shaping different radii, bends, angles etc., the workpiece (1) being optionally radially rotatable in the gripping device (5).
7. Process according to claim 6, characterized in that roller bending heads, right-hand/left-hand bending heads, and bending devices with mandrel devices, folding devices or the like are used as bending devices (6).
8. Process according to at least one of the claims 1 to 7, characterized in that the at least one bending device (6) is arranged with respect to a background in positionally fixed manner and the at least one robot arm (4) feeds the workpiece (1) continuously or batch-wise to the at least one bending device (6) or its bending heads for shaping, in particular bending.

9. Process according to at least one of claims 1 to 8, characterized in that the at least one robot (3), in particular the robot arm (4), removes the workpiece (1) from a supply bin (2), feeds it to the bending device (6) for shaping or bending and subsequent to bending to a storage area (8) for further machining, said robot again picking up a workpiece (1) to be shaped or bent from the supply bin (2).
10. Process according to at least one of claims 1 to 9, characterized in that subsequent to the shaping or bending of a workpiece (1), it is guided by the at least one robot (3) along a measuring device (9) so as to detect the shapes or bends as a desired value, a process inspection being conducted upon comparison of said value with a stored and selected desired value and optionally a re-shaping or re-bending being effected by means of the robot (3) re-feeding the workpiece (1) to the at least one bending device (6).
11. Process according to claim 10, characterized in that subsequent to re-bending or re-shaping, the workpiece (1) is re-fed, by means of the robot (3), to the measuring device (9) and only after there is agreement between the desired value and measured value or with the predetermined tolerance ranges is the workpiece (1) fed to the storage area (8) or to further machining.

12. Device according to at least one of the claims 7 to 9, characterized in that the workpiece (1) is delivered to another robot, a conveyor belt, a machine, a supply bin or the like as a storage area (8) or for further machining.
13. Process according to at least one of claims 1 to 12, characterized in that the robot (3) picks up the workpiece (1) and directly feeds it in selectable regions that are to be shaped to the bending device (6) or its bending heads, removes it subsequent to shaping, and feeds other regions or end parts of the workpiece (1) for further machining or shaping, after complete processing of the workpiece (1) the robot (3), particularly its gripping device (5), supplying the workpiece (1) for delivery or additional processing.
14. Process according to at least one of the claims 1 to 13, characterized in that the bending unit (7), particularly the bending device (6), can be manually and/or automatically moved with respect to the position of the robot (3).
15. Process according to claim 14, characterized in that the bending unit (7), particularly the bending device (6), can automatically or with a cross slide travel a linear system in a selectable direction or along a selectable guide system with respect to the position of the robot (3), the corresponding position coordinates being transferred to the robot (3).